IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

SPECIFICATION

INVENTION:	METHOD FOR DCUMENTATION OF DATA FOR A VEHICLE
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METHOD FOR DOCUMENTATION OF DATA FOR A VEHICLE

BACKGROUND AND SUMMARY OF THE INVENTION

[0001]   This application claims the priority of German Patent Application

No. PO 33422/US/1, filed November 21, 2000, the disclosure of which is expressly

incorporated herein by reference.

[0002]   The invention relates to a method for documentation of data for a

vehicle, with the data being stored in a data memory in the vehicle, the data in

the data memory being updated in the event of changes, and this data being

transmitted via a wireless data transmission device to a control center outside

the vehicle. The invention also relates to an apparatus for carrying out this

method.

[0003]   German Patent DE 198 53 000 A1 discloses a method and an

arrangement for supplying motor vehicles with data. The data is used for

operating closed-loop and open-loop control systems. A wireless data

transmission device between the vehicle and a control center insures that data

can be transmitted, checked or interchanged. Such data is used for operating, for

monitoring, for updating and for technical diagnosis and analysis, for example, of

the brake system, of the running gear, of the air pressure for the individual

wheels, etc. The major aspect of this method is telediagnosis, that is to say

wireless transmission of monitoring data, which is recorded by the control center

at regular time intervals. Then, if necessary, the control center initiates

corrective measures, as is known from diagnosis procedures during visits to

workshops.

[0004]   This method has the problem that the control center always has to

first make contact with the vehicle in order to make it possible to ensure access

to the data for that vehicle. Furthermore, in the event of radio contact, only a

narrow bandwidth is available for a short time period for wireless data

transmission. It is therefore necessary to make a selection from the available

data, that is to say the available data is not all transmitted.

[0005]   Furthermore, P10037397.6 discloses a method for loading software

into an intended appliance, and a vehicle control system for carrying out the

method, although the method is subject only to minor requirements for the

performance of the intended appliance. In this case, the loading of a software

module is subdivided into various partial steps. A step is defined, *inter alia*, for a

configuration manager, with a compatibility check being carried out from the

compatibility information stored directly with the software, regardless of

whether such information is still up-to-date.

[0006]   The invention is based on the object of providing a method which

simplifies the updating of products and compatibility checking of the products in

the vehicle, and/or stores data corresponding to the product configuration in a

control center outside the vehicle, and at the same time ensures that such data

represents an up-to-date standard and its chronological sequence.

[0007]   According to the invention, the data in the data memory in the

vehicle is updated in the event of changes, that is to say in particular on

exchange, addition, replacement and removal of products. Triggered by an

initiation signal, the data is then passed on from the control center to a

configuration documentation server. In a second step, this data is stored by the

configuration documentation server in a database in chronological sequence, and

is broken down into products, in particular product parts and/or technical

appliances and/or software.

[0008]   The invention has identified that, in the case of the method for

documentation, the storage of the configuration data in the database is broken

down on the basis of the various products, such as product parts, hardware or

software. The configuration of the products in the vehicle is thus recorded and

can be revised by means of search algorithms for evaluations of individual

products. In addition, this data can be checked at regular intervals to ensure the

quality and the latest product standard in the vehicle.

[0009]   Should it be necessary to break down the configuration data on the

basis of the individual vehicle, a unique identifier for the vehicle must be

transmitted during the wireless data transmission from the vehicle to the control

center, and must be stored with the data. The identifier may, for example, be a

vehicle identification number or any other type of unique code. In addition, the vehicle can also be identified by an individually assigned IP address or telephone number, which is checked when setting up a connection and which is likewise stored with the data.

[0010] Furthermore, the storage of the data independently of and outside the vehicle ensures monitored access to this data at any time by the vehicle manufacturer, the service station, etc. One major advantage of the invention is that there need not be any radio contact with the vehicle at the moment when the requirement for evaluation occurs. The data can be read at any desired time from the data memory within the vehicle, and can be stored independently of and outside the vehicle. Furthermore, this method makes it possible to ensure that, if the data memory in the vehicle is lost as a result of an accident or manipulation, the configuration data for the relevant vehicle is still available. In particular, efficient and revision-proof back-up systems for servers and databases make it possible to ensure that data loss is impossible.

[0011] A further advantage of the method according to the invention for vehicle documentation is the protection of evidence in the event of product liability, since the data is stored in chronological sequence in the database, that is to say with additional date information. This likewise allows the history of the products in the vehicle to be evaluated, that is to say their configuration changes in the life cycle of the vehicle or of the product.

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[0012] According to the invention, the data which is stored in a data

memory in the vehicle is sent to a control center, triggered by means of an

initiation signal, by means of wireless data transmission devices, and the control

center passes on this data to a configuration documentation server for storage in

a database. The compatibility requirements for the products, in particular

product parts and/or software, are stored on compatibility documentation servers

in databases. The documentation servers have interfaces for communication. A

compatibility check for the products in the vehicle, in particular product parts

and/or software, can thus be carried out by means of the data from the

documentation servers.

[0013] The invention has identified the fact that a compatibility

documentation server is preferably provided which stores information about

products, in particular product parts and/or technical appliances and/or software,

with such information indicating specific interrelationships which need to be

met. The data in the configuration documentation server is thus used to carry

out a compatibility check for the appropriate configuration standards in the

vehicle.

[0014] Central storage of the compatibility information on the compatibility

documentation server has the advantage that this information can be updated

quickly and errors resulting from obsolete compatibility data, which was entered

at the time of delivery of the product, in particular product parts and/or software, are avoided.

[0015]   In addition, the individual configuration data for the vehicle, i.e., the configuration documentation, and the compatibility requirements for the products, for example the product parts and/or software, i.e., the compatibility documentation, are available via compatibility testing interfaces, for checking the compatibility of the products in a vehicle.

[0016]   In one development of the invention, the initiation signal for wireless data transmission is triggered either by the control center and/or by a control unit on the vehicle and/or by the updating of the data memory in the vehicle. The check, for example by the control center, can be carried out regularly, in order to obtain validated information about the standard of the vehicles.

[0017]   If a manufacturer has the obligation to document all the configuration standards of a vehicle even after it has been sold, then it is possible to link this documentation to the updating of data in the data memory in the vehicle. This procedure could be expanded such that the customer confirms the transmission of the data by means of a control unit in the vehicle, or rejects it for secrecy reasons.

[0018]   The data transmission for the compatibility check can be initiated by the control center and/or by a control unit on the vehicle and/or by updating of

the data memory in the vehicle. Checking, for example by the control center in the works or a service station, may be necessary when changes have been recorded in the compatibility documentation servers. If any compatibility problems with specific configuration data are found, this vehicle can be specifically recalled.

[0019] The control unit on the vehicle allows the driver of the vehicle and/or the workshops in which the vehicle is maintained to carry out the compatibility test. If the compatibility test is coupled to the updating of the data in the data memory in the vehicle, then configuration errors can be found immediately, and procedures to overcome them can be carried out specifically.

[0020] In another development of the invention, once the data has been successfully stored in the database in the configuration documentation server, this data can be deleted in the data memory in the vehicle. This can be done, for example, by immediately deleting the data that has been successfully passed to the configuration documentation server as soon as the transfer has been correctly acknowledged or by such data being given a special identifier, and by such specially identified data being deleted at regular intervals. This has the advantage that the data memory in the vehicle can be kept small. Furthermore, this method can be used to ensure that only the updated configuration data for the vehicle is sent to the control center. This has the advantage that the narrow bandwidth for data transmission is used optimally.

[0021] Updates to products and/or product parts and/or software in the

vehicle are preferably allowed only after the data has been successfully stored in

the database in the configuration documentation server. This method has the

advantage of preventing changes to the vehicle which cannot be documented.

[0022] As an alternative, updates to products and/or product parts and/or

software in the vehicle can be specifically permitted without the necessity for the

data to be stored in the database in the configuration documentation server.

Further updating is then permissible only once the data has been successfully

stored in the database in the configuration documentation server. This prevents

discrepancies between the vehicle and the configuration documentation server.

[0023] Other objects, advantages and novel features of the present invention

will become apparent from the following detailed description of the invention

when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The sole figure illustrates an apparatus for carrying out the method.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0025] A vehicle 1 has a data memory 2, in which configuration data

relating to products, in particular product parts and/or technical appliances

and/or software, is stored. The configuration data is recorded automatically by the data memory 2, as soon as a change is carried out to the products in the vehicle 1.

[0026]   If the products contain software, the configuration data has an updating date, a designation for the software module, details of an intended appliance, a version standard and, optionally, the compatibility information which is already contained in the software.

[0027]   The data is read from the data memory 2 and is communicated to the control center 5 via a transmitting/receiving unit 3 by means of a wireless transmission device 4, which may be, for example, electromagnetic radiation via a satellite. The control center 5 passes on the received data to a configuration documentation server 7.

[0028]   The control center 5 may, for example, be a call center, from which the data is passed onto the appropriate points, in particular the manufacturer, workshops, customer center, vehicle 1, and documentation servers 7, 9. The control center 5 can be set up as a remote access point in a similar way to the dialing-in points for Internet services, thus passing on the incoming data automatically.

[0029]   The control center 5 is coupled directly to a network 12, as a result of which all the subscribers to this network 12 have access to the individual

documentation servers 7, 9, to the configuration manager 10 and/or to the control

center 5. The subscribers to the network 12 also include the works, the service

stations, the workshops and/or suppliers, in each case coupled via an already

existing network 12 of a manufacturer.

[0030]   The configuration documentation server 7 uses a database 6 to store

the configuration data arriving from the data memory 2 in the vehicle. The data

is stored in chronological sequence, i.e., on the basis of the time at which it is

entered in the database. This is ensured by storing the appropriate date at which

the updating of the vehicle took place, together with the data. This data is now

available via the terminal 11 to every subscriber to the network 12, in particular

to the control center 5 and/or to the documentation servers 7, 9, and can be used

for fault tracing, for the protection of evidence for product liability, and for

statistical purposes, etc.

[0031]   The control center 5 can initiate a compatibility test via an electronic

configuration manager 10 at any time. In this case, the electronic configuration

manager 10 carries out a comparison between the configuration data 6 for the

vehicle on the configuration documentation server 7 and the compatibility data

in the database 8 in the compatibility documentation server 9.

[0032]   If the products have software, a check is carried out, during this

comparison, to determine whether a specific up-to-date software module X in the

vehicle has any interrelationships with other appliances in the vehicle for a

specific intended appliance Y with a specific version standard Z. Requirements

for version standards of other software modules in the same intended appliance

or other appliances are checked in the process. The information required for

compatibility checking is already stored in the compatibility documentation

server. The information indicates, for example, that the software module X

requires the software module A in the version standard B in the intended

appliance C in order to operate correctly. Furthermore, the configuration

manager 10 uses the data from the configuration documentation server 7 to

check whether the specified configuration has actually been implemented in the

relevant vehicle.

[0033]   In another embodiment the products are technical appliances,

product parts or hardware. Data, in particular relating to the equipment fit and

the characteristic parameters, is stored as configuration data. The configuration

data for the product types include details relating to the date of updating, the

manufacturer, type, size and position on the vehicle. The configuration manager

10 can compare the configuration data on the database 6 with the compatibility

data on the database 8 to determine whether this product is compatible with this

vehicle, that is to say whether it satisfies the operating and appliance-specific

requirements.

[0034]   The foregoing disclosure has been set forth merely to illustrate the

invention and is not intended to be limiting. Since modifications of the disclosed

embodiments incorporating the spirit and substance of the invention may occur

to persons skilled in the art, the invention should be construed to include

everything within the scope of the appended claims and equivalents thereof.